FY02 FOURTH QUARTER REPORT

SUMMARY SECTION

PROJECT SUMMARY

Project Title: Science and Technology Action Team

Project Summary: Members support the new requirement to stand up and man the STAT watch center at ONR. STAT objective was established after 9-11 to provide a robust connection between the Naval Research Science Advisors (NRSAs) and the broader Navy Research Enterprise. Goal is to get the right S&T subject matter expert(s) in contact with the NRSAs within 24 hours of initial request.

Focus Area: ONR, Naval Fleet/Force Technology Innovation Office (NFFTIO)

Accomplishments:

1st QTR: CAPT […] (17 days) screened, helped interview and wrote the mobilization message for the 12 Program 38 members initially recalled to ONR/NRL. He also initiated the work to finalize specifications for the permanent STAT, including requirements for IT, Physical Security, COMSEC, furniture and display equipment. CDR […] (15 days) programmed the improvements to the STAT collaboration software. CAPT […] (17 days), CAPT […] (15 days) and CAPT […] (15 days) were STAT watch standers.

Plans for Future Support: Additional watchstanders may be requested on an as-needed basis.

Project Title: Future Naval Capabilities –Autonomous Operations

Project Summary: Reserve Liaison Officer (RLO) coordinates with ONR FNC AO program managers (UAV, UUV, UGV, Intelligent Autonomy) and identifies project support opportunities. Opportunities suitable for Program 38 support include (but are not limited too) reviewing proposals, conference attendance, observing technology demonstrations, participating in war games, and updating program databases.

Focus Area: FNC

Accomplishments:

1st QTR: LCDR […] re-established contact with ONR FNC program managers after completing a 57 ADT with Commander, US Naval Forces Southern Command in Puerto Rico in September. An immediate project in need of support was identified involving proposal reviews for the UAV Program Manager. As RLO for FNC AO, LCDR […] found volunteers for this project in fellow unit members LCDRs(sel) […] and […]. LCDR […] also delegated to CDR […] (ONR HQ 106 unit) liaison and support activities for the AUV/UUV Program manager Dr. […]. LCDR […] attended the FNC RLO Conference held at ONR on Nov 26/27. He started incremental drill work for the Intelligent Autonomy working group. He began updating their database with meetings with Florida Atlantic University principal investigators. Total time spent so far this quarter is 5 man-days.

LCDR(sel) […] reviewed 8 proposals in the Sensor Data Interpretation area and 6 proposals in the Adaptive Navigation Technologies area. He provided ratings and comments for them to the technical evaluation panel chair. He supported the teleconferences as necessary. Total time spent so far is 40 man-hours or 5 man-days.

LCDR(sel) […] was tasked by ONR 353 ExLog, to provide "tactical & logistic" observations on a leased ARMY and NAVY vessel called the JOINT VENTURE. This all-aluminum catamaran Australian vessel named JOINT VENTURE is a high-speed vessel encompassing future logistic "streetfighter" vision. His five day underway included open ocean transit, range operations for sound cuts, a race between JOINT VENTURE and the Scandinavian SKOGE composite vessel, man overboard drills, general observations on how to onload and drop a Unmanned Underwater Vehicle9 (UUV) at high speed.

2nd QTR: Attended Intelligent Autonomy working group meeting at Eglin AFB. Conducted site visits and technical evaluations of Intelligent Autonomy programs at Florida Atlantic University (FAU) and the University of Miami. Data collected uploaded into the Intelligent Autonomy database. Wrote project support descriptions for further data contributions by other reservists. Attended South Florida Ocean Measurement Center (SFOMC), Dania Beach FL, organizational meetings involving principals from the Navy and participating civilian research institutions. SFOMC will be a major test & evaluation site for AUV operations as well as a Littoral ASW research site.

Plans for Future Support: Annual training at the National Defense University Wargaming and Simulation Center 29 April – 10 May. Goal is to incorporate FNC concepts into wargame scenarios. Draft project support descriptions for reservists to attend the 10th International Ground Vehicle student competition (06 July-08 July) and the AUVSI Unmanned Systems Symposium in Orlando, FL (09 July - 11 July). Participate in FBE-J as an observer/analyst (July-August).

Project Title: NRL Stennis Space Center Project Recruitment

Project Summary: Inform NRL SSC of resources available for project support. Generate list of projects and recruit Program 38 personnel to support them.

Focus Area: NRL

Accomplishments:

2nd QTR: Along with members from the NRL S&T DET 108 unit, LT […], LCDR […] and CAPT […] met with DR […], CDR […] and their Principal Investigators at NRL SSC. Briefed them on Program 38 resources available and interviewed 12-15 Principal Investigators that seemed to have the greatest need for support. Generated a detailed table of 18 project opportunities, which have been advertised to Program 38 and are now on the website. So far, qualified reservists have staffed 8 of these projects.

Plans for Future Support: LT […] will continue to track these projects, and report on staffing status to sponsors at NRL SSC and COs of DET 510 and 108.

Project Title: Navy-NRL Liaison to the DoD Space Test Program Office at NASA Johnson Space Center

Project Summary: LCDR(sel) […] serves as the Navy-NRL Liaison to the DoD Space Test Program (STP) Office at NASA Johnson Space Center, Houston, TX.

Focus Area: NRL, Code 7600

Accomplishments:

2nd QTR: LCDR(sel) […] conducted a comprehensive evaluation of STP Houston's computer based training course and provided constructive feedback to the application developers. He also began an investigation into the feasibility of flying an Interstellar Debris Sensor/Collector (NRL 7600-JPL-University of Florida) on the International Space Station. LCDR(sel) […] regularly interacts with the USAF Staff of the STP Houston office in support of Navy and NRL interests. Total support this quarter was 36 man-hours.

3rd QTR: LCDR […] continued supporting the preliminary coordination of a potential NRL payload Interstellar and Orbital Debris Sensor/Collector (NRL 7600-JPL-University of Florida) on the International Space Station. LCDR […] regularly interacts with the USAF Staff of the STP Houston office in support of Navy and NRL interests. Total support this quarter was 12 man-hours.

4th QTR: LCDR […] performed AT in support of the DoD STP at NASA in Houston. During this period, he attended the Naval-NRO Conference - "Space and Naval Transformation" in Chantilly, VA on July 24-25. On a second week of AT to the Naval Research Laboratory, LCDR […] assisted the executive board in the execution of the FY03 Navy Space Experiments Review Board (Navy SERB). LCDR […] also continued supporting the preliminary coordination of a potential NRL payload Interstellar and Orbital Debris Sensor/Collector (NRL 7600-JPL-University of Florida) on the International Space Station. LCDR […] regularly interacts with the USAF Staff of the STP Houston office in support of Navy and NRL interests. Total support this quarter was 96 man-hours.

Plans for Future Support: Investigate the feasibility of including other NRL 510 members (those who work at NASA as civilians) in the Navy STP support structure. Continue to represent Navy-NRL interests to DoD Space Test Program, Houston, and integrate into the active USAF STP staff on a part-time basis to work NRL payload issues at NASA Johnson Space Center.

Project Title: UAV Video Systems

Project Summary: NRL-SSC 7440 (Mapping, Charting, and Geodesy) is developing a UAV-deployed, video-based mapping system for providing on-demand mapping products in emergent situations. The goal of this project is to develop a system for the collection and analysis of shoreline and beach imagery that can be used to evaluate and predict beach characteristics relevant for littoral and amphibious warfare. The system would ultimately be deployable on a UAV. The hardware is largely COTS based and has already been demonstrated in amphibious exercises at Camp Pendleton. The system can provide very high-resolution video-maps for targeting, amphibious assault planning, and surveillance but currently complex data processing greatly limits usability.

Focus Area: NRL, Code 7440

Accomplishments:
2nd QTR:
In this quarter, LT […] spent 40 hours on site at NRL-SSC evaluating the data processing phase of this system and developing beta software for automating this part of the process. As a result, 8 hrs of aerial video can now be post-processed in 8 hrs time and without user input compared to the previous time of 3 days with constant supervision – a necessary step forward towards a usable product. Processed several gigabytes of digital video imagery transforming the imagery into a rectified form that could be used to make quantitative measurements of beach morphology. Beta tested a software video routine for processing beach imagery.

Plans for Future Support: Project will continue with additional image processing.

Project Title: Navy Research Psychologist Web Site

Project Summary: The Research Psychology Web site is the responsibility of CDR […] from ONR. The site facilitates information exchange between Navy Research Psychologist including research topics that benefit the Navy.

Focus Area: FNC, ONR Code 341

Accomplishments:

2nd QTR: Modified and updated Research Psychology Web Site. Reviewed site, deleted outdated information, added new information as they occur. "Man" Days: 2.5

Plans for Future Support: Continue to support the modifications and updates of the Navy Research Psychology Web Site

Project Title: Submariners Fatigue Study

Project Summary: The effect of sleep deprivation on sailor performance is becoming a big concern in the Navy. This ONR sponsored study is an extension of my FY2001 AT at the Brooks AFB Sleep lab in conjunction with several Navy Research Psychologists.

Focus Area: FNC, ONR Code 341

Accomplishments:

2nd QTR: Quantitative analysis of fatigue study data. "Man" Days: 6

3rd QTR: Quantitative analysis of fatigue study data. "Man" Days: 6

Plans for Future Support: Continued quantitative analyses of fatigue study data.

Project Title: Science Fairs

Project Summary: Members participated by judging in the ONR Sponsored Science Fair Competitions.

Focus Area: NRL

Accomplishments:

2nd QTR: Volunteered as Science Judge and Scorekeeper during ONR sponsored South Florida Regional NOSB competition at Harbor Branch Oceanographic Institution, Ft Pierce FL. Made positive impression of US Navy Reserve to several competing high school teams from around the state.

3rd QTR: LCDR […] judged the Austin Texas Science Fair. His contribution was focused on providing one-on-one technical and personal discussions with local high school juniors and seniors. He used this event to talk with students, draw on his past experience in both the Navy and in his Civilian employment to help inspire individuals to continue to focus their goals to investigate science and engineering as meaningful and fun paths for future schooling and careers. His contribution provided an outstanding example of military leadership to the local community.

Plans for Future Support: LCDR […] will volunteer time or use incremental/flexible drill for next year's (2003) South Florida Regional National Ocean Science Bowl competition.

Project Title: JOINT VENTURE

Project Summary: Performed five-day underway on HSV Joint Venture is an aluminum High Speed Catamaran being testged by multiple DOD services. With my prior operational experience, I provided ONR 353 a paper, listing tactical scenarios advantageous to this High-Speed heavy equipment catamaran design. I included engineering/operational concerns recommending a redesign of the ship's brow to provide quicker/more reliable access to the pier and recommended to ONR installing an electric elevator from the flight deck to the cargo spaces.

Focus Area: FNC

Accomplishments/Impact:

1st QTR: Completed 5 day underway on aluminum catamaran JOINT VENTURE. Provided paper to ONR 353 on different tactical advantages and redesigns prior to acquisition.

Plans for Future Support: LCDR […] will volunteer to go underway during JOINT VENTURE real time operations submitting operational feedback on ship/crew performance for ONR.

Project Title: Strength of Welded Steel Joints / HSLA Welds

Project Summary: Laboratory experiments are useful for measuring the strength of small-scale specimens. However, it has been found that scaling the results of laboratory-scale tests to predict the strength of large structures, such as a ship hull girder, can be surprisingly inaccurate. The focus of this research project is to incorporate the non-homogeneous mechanical properties of HSLA steel welds into analytical strength models (finite element models) to improve modeling accuracy.

Focus Area: NRL, Code 6350

Accomplishments/Impact:

2nd QTR: The objective of this effort is to better evaluate the strength of welded steel joints, such as those used to fabricate ships and equipment, with an ultimate objective being to allow more economically viable welding/fabrication methods to be used in ship and equipment production. During the second quarter work was initiated with NRL Branch 6350. A finite element model was developed to evaluate the true strength of steel welds under tensile, bending and combination load scenarios. Modeling efforts will include the materials properties of the base steel, weld metal and heat affected zones.

4th QTR: LCDR […] met with representatives of the Multifunction Materials Branch (NRL 6350) and Physical Metallurgy Branch (NRL 6320) to plan the research project. A software program that maps hardness profiles of a HSLA 100 weld to a high fidelity finite element model was written. The high fidelity finite element models were run to study how the non-homogeneous properties of the weld affect the joint strength.

Plans for Future Support: Results will be compared with laboratory experiments, and parametric sensitivity analyses will be conducted.

Project Title: Unmanned Underwater Vehicle (UUV) Task Force

Project Summary: Develop low bandwidth communication requirements between multiple UUVs in high signal to noise environments, with restricted maneuvering between vehicles.

Focus Area: NRL Code 7440.5 /Unmanned Underwater Vehicles

Accomplishments:

3rd QTR: Determine the Position, Navigation, and Timing requirements and viable approaches for each phase of notional single and multiple UUV Operations. LCDR […] performed a two day IDTT at Stennis Space Center, Naval Research Laboratory Detachment being briefed on the timeline for U.S. Navy research into unmanned aerial, surface, and underwater autonomous vehicles. Discussions with Dr. […] focused on the severe limitations on communication range, bandwidth and speed of propagation in the water a key technical problem that must be solved for the successful deployment of a UUV task force is Position, Navigation, and Timing (PNT). LCDR […] was assigned to perform 2 weeks of research investigating low bandwidth communication protocols to support PNT for UUV operations.

4th QTR: LCDR […] (12 days) researched historical documentation on classic military low bandwidth communication methods (signal flags, bells, etc) developing several models of transferring multiple formation and operational commands between the Primary and Secondary UUVs.

Plans for Future Support: 1st quarter 2003 performing IDTT at Stennis Space Center, Mississippi correlating data into a Major Conclusions one-hour briefing and further investigation on classic low bandwidth Army communication measures.

Project Title: Support to Commander, Mobile Mine Assembly Group

Project Summary: This project provides technical support to COMOMAG and develops collaborative work with NRL – Stennis personnel involved in mine warfare related R&D. Every two years Commander, Mobile Mine Assembly Group (COMOMAG) is required to prepare inputs for a Non Nuclear Ordnance Requirements (NNOR) review. COMOMAG's inputs to the NNOR are the estimates of how many of each type of mine in the Navy inventory will be required in future fiscal years. The NNOR inputs are eventually used in the POM cycle for preparing budget estimates for the up coming fiscal years. COMOMAG's concern is that the process they use to prepare the NNOR is somewhat subjective. The estimates are based in part on the requirements from the fleet commanders and also involve the skill and experience of the individuals preparing the input. The command would like to develop some metrics and analytic tools that will reduce the subjectivity of their NNOR estimates and make them easier to defend during the review process.

Focus Area: NRL

Accomplishments:
2nd QTR:
Established initial contact with COMOMAG. Met with members of the planning and requirements department to identify needs and requirements. Assembled project support team. Project support team spent a drill weekend at COMOMAG being briefed on minefield planning and how COMOMAG currently prepares their NNOR inputs. Identified areas in their process where subjectivity is introduced.

4th QTR:
Developed a set of proposed metrics for preparing COMOMAG's inputs for the NNOR.

Project support team spent a drill weekend at COMOMAG briefing staff planners on the proposed metrics for the NNOR and receiving feed back from the staff. Met with representatives from Coastal Systems Station Panama City FL who prepare updates to the GOPAS software used in minefield planning. Discussed with them how GOPAS works and how it might be updated to assist in preparing more accurate NNOR inputs. Attended sections of the Joint Strike Planning course that was being conducted at COMOMAG that weekend.

Plans for Future Support: Based on feed back from COMOMAG staff, refine the proposed metrics. Contact representatives at OPNAV N752 to discuss how other ordnance providers prepare their NNOR inputs. This should provide useful information for improving COMOMAG's process for NNOR inputs.

Project Title: Platform System Modeling

Project Summary: To support work in navigational systems. Developing a high fidelity model of the Gravimeter used by NRL for field measurements. Developed mathematical models for inertial measuring instruments (gyroscopes and accelerometer) and started to incorporated them into the mathematical models of the gravimeter.

Focus Area: NRL, Code 7420

Plans for Future Support: Continuing with the integration of the models, once the single axis model is completed, plan to verify and validate it with data colleted by code 7420.

Project Title: Geospatial Information DataBase (GIDB™)

Project Summary: GIDB is a Government Off-The-Shelf (GOTS) visualization tool that provides a common user interface to numerous cartographic, imagery, and GIS products available through the Internet. It is structured as an open, object-oriented database system and is coded in the Java language. Additional information is available at http://dmap.nrlssc.navy.mil/ . The goal of this project is to provide reserve support for writing additional code to expand GIDB's capabilities.

Focus Area: NRL, Code 7440.2

Accomplishments:

2nd Qtr: Requirement for support established by NRL Stennis recruitment team.

3rd Qtr: Established the requirement for a "Web Raster" interface driver that can pull images from public web sites, run an inverse cartographic transform (if necessary), geo-rectify the image, and serve it up to the GIDB system. The following list contains some examples of web-based raster images that we would like to include:
http://www.ssec.wisc.edu/data/east/latest_eastvis.gif

http://www.ssec.wisc.edu/data/sst/latest_sst.gif

http://www.crh.noaa.gov/radar/images/DS.p19r0/SI.kiwx/latest.gif

Completed coding, debugging and demonstration of basic Web Raster interface driver. Added code to filter the resulting image by including or excluding certain colors from a user-defined table. The filtered out colors are all set to black and made transparent, simplifying the process of layering images in the user interface.

4th Qtr: Continued expanding the capabilities of the web raster module. Added better filtering for NEXRAD images, automatic image stitching, wildcard search capability, polar stereographic transforms, better error trapping, and documentation.

Plans for Future Support: Incremental drill support as needed for adding new features, such as additional cartographic transforms, to discover additional web images and determine the necessary cartographic transform parameters, and to conduct any debugging needed. Possible IDTT or AT in 1Q03 for additional integration.

Project Title: Satellite Imaging

Project Impact Summary: Merging Ocean-color Satellite Images at Different Resolutions. Compared reflectance values and spatial variability of image-pixel data from remotely sensed image pairs including Landsat and Seawifs, MOS and Seawifs, and Phills and Seawifs. This work provides an understanding of how to merge different sets of ocean color image data at different resolutions so that they can be used seamlessly to produce, for example, modeled predictions of swimmer visibility for a particular area.

Focus Area: NRL

Accomplishments:

4th QTR: LCDR […] (16 days: 12 AT, 4 IDTT) gathered, processed, and analyzed data from remotely sensed image pairs at different resolutions over Tampa Bay, Mobile Bay, and Chesapeake Bay. LCDR […] used techniques that included image textural analysis, semivariogram analysis, linear regression to compare pairs of images taken with different sensors having different spatial and spectral resolutions. The results highlight the lack of precision in low-resolution imagery such as that from Seawifs, and suggest ways in which Seawifs data could and should be supplemented with higher-resolution image products. A publication based on this work is being written.

Project Title: Marine Mines Deployment Study

Project Impact Summary: Factors affecting the Burial of Marine Mines during their Deployment. Developed equations that predict the probable sediment impact velocity (and other parameters) of marine mines as they are deployed and based on mine characteristics. This analysis ties in with ongoing NRL – SSC research into factors that affect mine burial and dealing with the consequences of buried mines.

Supported Focus Area: NRL, Code 7440

How you did it: Used digital video techniques to analyze data collected during 190 drop tests conducted at NSWC Carderock and developed computer code to conduct detailed statistical analysis and visualization of this very large mine drop dataset.

Plans for future support: Additional incremental drills are necessary to run and verify the final statistical models.

Project Title: Gray Water Filtration Project

Project Summary: Improve the production of filtration plants for cleaning gray water. Construct a pilot test bench for application to shipboard gray water filtration/clean up.

Focus Area: NRL, Code 6115, Environment and Biotechnology Program Office

Accomplishments:

4th QTR: CDR […] (12 days AT) researched literature on oxidation, micro and ultra filtration, water quality instrumentation and marine wastewater technology for applicability in treating gray and black water aboard Navy vessels. Investigated and provided recommendations for improvements to both NRL's gray-water bio-reactor and NAVSEA Code 633 gray-water pilot treatment system. Provided 2 days (Incremental Drill) support in researching advanced oxidation technologies (wet air oxidation and photo-catalytic oxidation) for possible future use in a gray-water treatment system.

Plans for Future Support: Will continue research into advanced oxidation technologies and provide recommendation for possible research areas.

Project Title: Corrosion and Coatings Lab / Testing

Project Impact Summary: Provides support to NRL Center for Corrosion Science

Supported Focus Area: NRL

How you did it:

3rd QTR: LCDR […] provided support to the Center for corrosion sciences at the NRL key west facility, performed pneumatic tensile testing of over 150 samples, initiated the development of a database to track the various test panels and results.

4th QTR: CDR […] initiated the bilge coating project by conducting extensive tests on various coating samples. Collected data on test results for presentation to Lockheed Martin. Provided support for the pump spray system and did some painting and assembly. Instrumental in getting bilge coating project in motion. Sample preparations for over 300 panals which included conditioning, backcoating, and edgecoating prior to application of test paints. (This was over 3 weeks of work). Conducted destructive testing on selected powder coating samples. Assisted in gathering and assembling data for Lockheed Martin coatings presentation. Ran electrical, assisted in assembly of Gusmer pump spray system. Attended 2 day training of operating this equipment. Paint and assembled ammo box covers for insulation testing. Inspected and photographed test panals in Miami for anti-foulant project.

Plans for future support: Continuing with the development of database to assist the lab in cataloging and archiving of the test samples. Opportunities for future AT's and IDTT's available.

Project Title: ONR Data Mining Research

Project Impact Summary: Information extracted from Data Mining will be used by ONR-IFO-London to establish critical contacts and collaborations with internationally renowned researchers in research areas of interest to ONR-IFO-London.

Supported Focus Area: IFO

How you did it: LCDR […] volunteered and successfully completed Data Mining training at ONR. Immediately utilized newly acquired Data Mining knowledge by volunteering to support ONR-IFO-London. Took the lead and proposed and executed various analyses to POC. Downloaded 36,000 bibliographic information on Biomaterials and performed Data Mining using TechOasis software. Provided descriptive information as well as factor maps on keywords and researchers.

Plans for future support: Will continue to perform more in-depth data mining on Biomaterials as well as other key areas provided by customer.

Project Title: Science, Technology, and Engineering (ST&E) Database

Project Impact Summary: Created a fully relational database of Program 29 Officers and Enlisted as the skeleton for a future Science, Technology, & Engineering (ST&E) database.

Supported Focus Area: NRL

How you did it: Created a database of Officers in Program 29 to include personal profile information, education, skills, and both military and civilian experience. Populated this database with existing current data from the EDO database. Developed this database to be updated using data migrated from the monthly Global report and TFFMS. Began to create reports and forms for user interface.

Plans for future support: Development of this database can continue during Incremental Drills, IDTT's and future AT's to NAVSEA. Plan to continue support and development remotely as much as feasible.